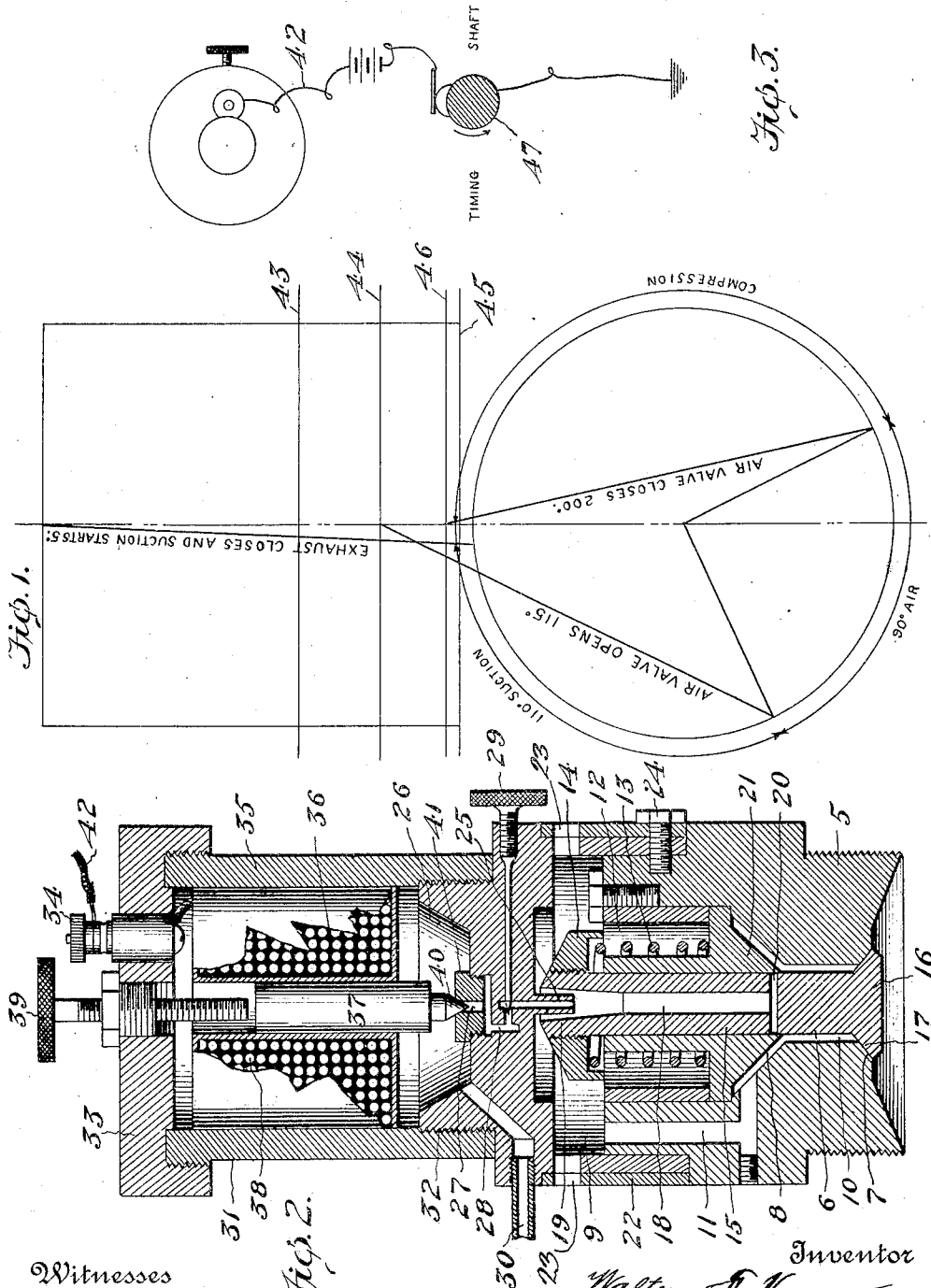


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ELECTRICALLY CONTROLLED VAPORIZER FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED DEC. 13, 1913.

1,150,562.

Patented Aug. 17, 1915.



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UNITED STATES PATENT OFFICE.

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ELECTRICALLY-CONTROLLED VAPORIZER FOR INTERNAL-COMBUSTION ENGINES.

1,150,562.

Specification of Letters Patent.

Patented Aug. 17, 1915.

Application filed December 13, 1913. Serial No. 806,574.

To all whom it may concern:

Be it known that I, WALTER F. VOSE, a citizen of the United States, residing at Bloomington, in the county of McLean and State of Illinois, have invented certain new and useful Improvements in Electrically-Controlled Vaporizers for Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention is an electro-magnetical control vaporizer, wherein a low grade hydrocarbon fuel, such as kerosene, may be atomized and supplied to an internal combustion engine.

The invention has for its purpose to reduce the cost of maintenance of engines of this class by the utilization of a low grade hydrocarbon fuel, such as kerosene or crude oil which may be introduced to the engine without previously heating the oil or the motor, or without the previous use of some highly volatile fuel.

The further purpose of the invention is to so atomize the hydrocarbon substance and mix the same with air, that it will produce a combustible mixture which will be completely consumed by the engine without creating excessive smoke, and which will leave substantially no deposit of carbon within the cylinder of the engine. The employment of a slower burning fuel will give greater power to the engine owing to its greater expansion.

The invention contemplates the automatic supply of hydrocarbon fuel, which is controlled by the action of an engine through the medium of an electro-magnetic valve connected with the timing shaft of the engine, the fuel being atomized and mixed with air on a plurality of occasions prior to its introduction into the engine cylinder. The timing of the engine is slightly changed to permit of introduction of air to the combustible mixture just prior to the compression stroke, to facilitate the operation of the mixing valve by the suction stroke of the engine.

The invention consists also in the combination and arrangement of parts which will be more particularly hereinafter pointed out and set forth in the appended claims.

In the embodiment of the invention illus-

trated in the accompanying drawings—Figure 1 is a diagrammatical view illustrating the operation of the engine on its first revolution showing the three steps in the revolution; Fig. 2 is a vertical sectional view through the atomizer; Fig. 3 is a diagrammatical view illustrating the connection of the atomizer with the timing shaft.

In the form of atomizer illustrated in the drawings, there is provided a base 5 which is adapted to be screwed directly to the head of the cylinder of an engine. Within this base is provided a central aperture 6 having an inclined seat 7. The upper portion of the aperture is preferably enlarged to form the inclined walls 8. The base is provided with large chamber 9 for the admission of air, which is connected to a lower chamber 10 formed by the walls 8 through any suitable means, such as a passage 11. A suitable spring chamber 12 is also formed in this base within which may be inserted the helical spring 13, which is adapted to bear against the head 14 secured to a valve stem 15 of a mixture valve 16. This mixture valve is provided with inclined walls 17 which are adapted to bear tightly against the seat 7 in the casing. The valve stem 15 is provided with a longitudinal channel 18 terminating in a flared opening 19 in the upper end thereof which enters the air chamber 9. The lower end of the channel 18 terminates in a transverse passage 20 which is adapted to be closed, when the mixture valve 16 is in its normally closed position, by the walls 21 of the central portion of the base 5. A slidable sleeve 22 may be mounted upon the base 5, which sleeve is provided with suitable apertures 23 to register with suitable apertures in the wall of the base 5 leading to the air chamber 9, whereby the supply of air to the chamber 9 and chamber 10 may be controlled. This sleeve may be secured in its adjusted position by any suitable means, such as the screw 24. The mixing valve 16 is vertically movable within the base 5, and is retained in its closed position by the action of the spring 13. On the suction stroke of the engine the valve 16 and its stem 15 are moved downwardly to open the passage 20 of the stem, as will be presently described.

The lower section of the atomizer is provided also with a nozzle 25 leading into the widened portion of the channel in the valve

stem. The upper end of this section of the base is chambered out as at 26 to produce a fuel chamber, and leading from this chamber 26 is a passage 27 which communicates with a well 28. A suitable passage connects the well with the nozzle 25 and, when desired, this passage may be closed by a manually adjustable valve, shown as a needle valve 29, which controls the amount of hydrocarbon fluid to pass from the well 28 through the nozzle 25, into the channel 18 of the valve stem. The hydrocarbon fluid is fed to the chamber 26 through the passage 30 in the base 5 from a suitable source of supply.

The upper section 31 of the atomizer is adapted to be screwed or otherwise secured to the lower section at 32, and this upper section is provided with a removable cover 33 within which may be secured suitable contact posts 34 for an electrical connection. The upper section is provided also with side walls 35 to form a chamber within which is positioned a solenoid. The coils of wire for the solenoid are indicated at 36, while the movable core thereof is indicated at 37. The core is guided in its vertical movement by the walls 38 positioned within the coils 36, and is limited in its upper movement by a set screw 39. The lower end of the core 37 is shown conical as at 40 to fit a valve seat in the valve plug 41 of the fuel chamber. The solenoid is suitably connected by the conductor 42 with means to energize the same at a predetermined position of the timing shaft of an engine, which is indicated at 47 in Fig. 3.

Assuming that the atomizer is employed with a four cycle internal combustion engine, it is proposed to introduce three steps to the first revolution instead of the usual two steps thereof. By reference to Fig. 1, the first step comprises the suction stroke which will move the piston of the engine from the line 43 to the line 44, the engine shaft describing an arc of substantially 110 degrees of the circumference of its travel for the suction stroke. During this downward movement of the piston for the suction stroke, the timing shaft 43 is energizing the solenoid to lift its core 37 and open the valve 40 to permit hydrocarbon fluid to be sucked from the chamber 26 through the nozzle 25, through the valve passage 18 and the valve 16, into the engine cylinder, the hydrocarbon fluid being intermingled with air from the chamber 9 at the mouth of the nozzle 25 and again at the chamber 10 when the mixture passes through the ports 20 of the valve stem. This suction creates a partial vacuum in the engine cylinder and when the piston reaches the point 44, the energy will be taken from the solenoid, and the usual air inlet valves of the engine will be open for substantially 90 degrees to fill up

the vacuum created in the engine cylinder, and to further suspend the hydrocarbon atoms in the aerated mixture. The remainder of the revolution, indicated by the passage of the piston from the line 46 back to the line 43, serves as the usual compression stroke. The explosion and exhaust steps are carried out in the usual manner.

It will therefore be observed that the action of the mixing valve 16 is automatic and controlled by the suction stroke of the engine; that the supply of hydrocarbon fluid is automatically controlled by the electromagnetic valve energized at predetermined points by the timing shaft of an engine, and that the hydrocarbon fluid is mixed with air on a plurality of occasions prior to its admission to the engine cylinder.

It is obvious that various changes and modifications may be made in the form and proportion of the parts, but the right is reserved to make such alterations and changes therein as thoroughly fall within the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In an internal combustion engine, an atomizer adapted to be secured directly to the casing of an engine and to communicate with the cylinder thereof, means to supply fuel to the atomizer, a mixture valve carried by the atomizer and adapted to be opened by the suction stroke of the engine, a fluid chamber in said atomizer, a nozzle leading from the fluid chamber to the mixture valve, an electro-magnetic valve to control the passage of fluid from the fluid chamber, means to admit air to the fluid passing from the nozzle, and means to admit air to the combustible mixture as it passes through the mixture valve.

2. In an internal combustion engine, an atomizer provided with a base, a spring actuated suction controlled mixture valve movable in said base, a source of fuel supply, manually operated valve to control the passage of fuel to the mixture valve, means to supply air to the fuel at a plurality of points prior to its passage through the mixture valve, and an electro-magnetic valve operated at predetermined intervals by the operation of the engine to control the passage of fluid from the source of supply to the mixing valve.

3. In an internal combustion engine, an atomizer for heavy hydrocarbon fuel comprising a casing, a fuel supply chamber, a well, a passage from said chamber leading to said well, an electro-magnetic valve to control the passage of fuel from the chamber to the well, a nozzle, means to control the passage of fuel from the well to the nozzle, means to supply air to the fuel as it emerges from the nozzle, means to control the supply

of air to the nozzle and a mixing valve adapted to open into the engine cylinder and to be operated by the suction stroke of the engine.

5 4. In an internal combustion engine, an atomizer for heavy hydrocarbon fuel comprising a casing, a fuel supply chamber, a well adjacent the chamber, a passage from the chamber leading to the well, an electro-
10 magnetic valve controlling the passage of fuel from the chamber to the well, a nozzle, a manually operated valve to control the passage of fuel from the supply chamber to the nozzle, a mixture valve provided with a
15 stem having a passage for combustible mixture, means to cut off passage of fuel through the stem when the valve is closed, means to supply air to the fuel within the stem, and means to supply air to the fuel
20 mixture as it emerges from the stem and passes through the mixing valve into the engine.

5. An atomizer for internal combustion engines comprising a casing divided into

an upper section and a lower section, the 25 upper section being provided with a fuel chamber, a well adjacent said chamber, and a valve to control the passage of fluid from the chamber to the well, said valve comprising a solenoid coil, a solenoid core, electrical 30 connection, with said coil, adjustable means to limit the movement of the core, a nozzle extending from the well, and a valve controlling the passage of fluid through the nozzle; the lower member comprising a mix- 35 ing valve having a hollow stem, a valve seat in the base of the casing, means engaging the stem to normally retain the valve against the seat, and means to admit air to the fluid at a plurality of points prior to its passage 40 through the mixing valve.

In testimony whereof, I affix my signature, in presence of two witnesses.

WALTER F. VOSE.

Witnesses:

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